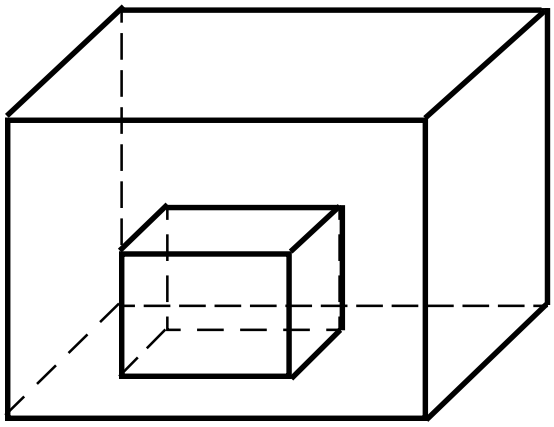
A Packer's Nightmare

High School Math Performance Event



by

Susie Hallar

Jeff Bryant

MAP Team Members
West Central Regional MAP Center

A Packer's Nightmare

Purpose: This performance event will assess the student's ability to calculate volume and demonstrate an understanding of the concepts of length, width, and height. The student must use his/ her geometric and spatial sense to solve a complex problem. The student is asked to determine what size of cartons will fit into a master pack or shipping box. An explanation is required that gives the justification for the choice of carton size.

Show-Me Standards Addressed:

Knowledge: M2
Performance: 4.1

Grade Level Range: High School Level

Subject Area: Math

Materials and Resources Needed: pencil, ruler, calculator (optional), Student Performance Event Packet (including the Student Prompt, the Response Sheets, and the Scoring Guide).

Time Needed for Event: One 50 minute period

Instructions for Administration: Provide students with a Student Performance Event Packet. Make sure they understand the directions within the student prompt. They will need to write their responses on Student Response Sheets #1 and #2. Go over the scoring guide so students know what is expected for a quality response.

Pre-assessment Instructions: Students will have to have the prerequisite knowledge of calculating volume. It may be a good idea to provide previous hands-on experience with students placing smaller boxes into larger boxes.

Student Prompt
A Packer's Nightmare

You work as a packer at a company which makes beads that must be shipped in a master pack (shipping box) with the dimension of 10 in. X 10 in. X 10 in. Each box needs to be filled with as many cartons of 100 beads as possible. You need to determine the size of carton that will allow you to ship the most beads and will fit into the master pack. You have four choices for carton sizes:

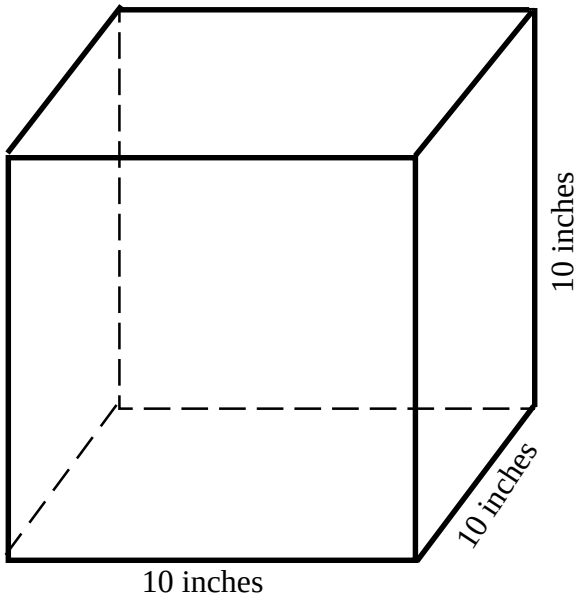
Carton Size A	1 in X 1 in. X 16 in.
Carton Size B	2 in X 8 in. X 1 in.
Carton Size C	4 in X 2 in. X 2 in.
Carton Size D	4 in X 4 in. X 1 in.

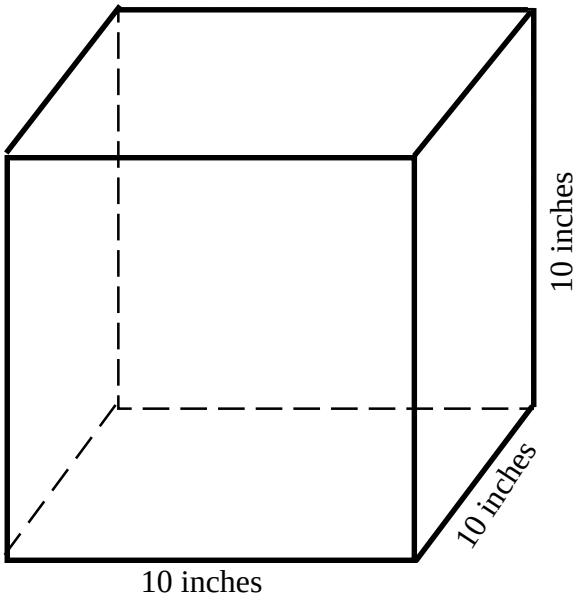
To find the carton size that you need, draw and label the four sketches on Student Response Sheet #1 showing how each size box fits into the 10 in. X 10 in. X 10 in. master pack.
Be sure to tell how many of each size of cartons will fit into the master pack.

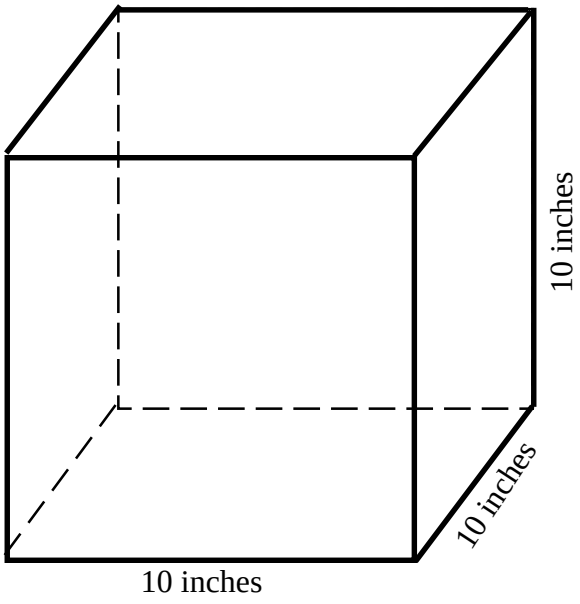
After you have discovered the carton size that will allow you to ship the most beads and will fit into the master pack, write a paragraph which states your choice and give reasoning to explain why you recommend that size.

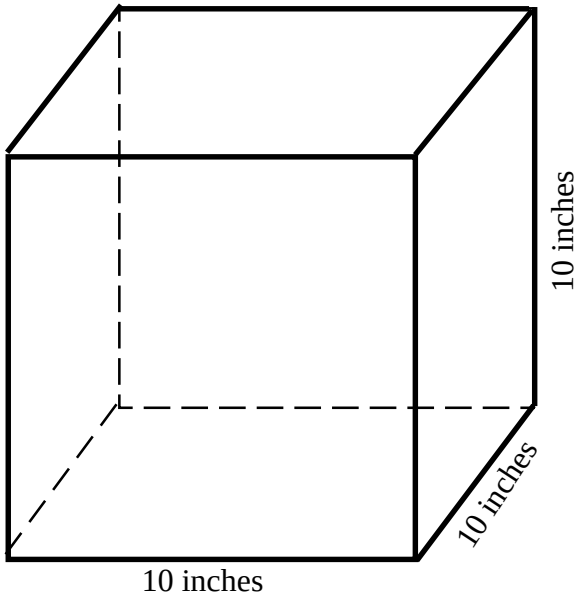
Packer's Nightmare
Student Response Sheet #1

To find the carton size that you need, draw and label the four sketches on the Student Response Sheet showing how each size box fits into the 10 in. X 10 in. X 10 in. master pack. Be sure to tell how many of each size of cartons will fit into the master pack.









Based on your findings , which carton size will work best ?_____

Packer's Nightmare
Student Response Sheet #2

After you have discovered the carton size that will allow you to ship the most beads and will fit into the master pack, write a paragraph which states your choice and give reasoning to explain why you recommend that size.

Packer's Nightmare
Scoring Guide

Score Point: 4

The response shows the student has a complete and accurate understanding of the needed mathematical skills to solve the problem. The student has chosen either 4 in. X 2 in. X 2 in. or 2 in. X 8 in. X 1 in. which is equal to 62. The number of cartons (62) that the master pack (shipping box) will hold has been indicated. All four of the sketches show how the size of carton fits into the box and have been clearly labeled with sizes. The explanation for the choice clearly communicates the support. The explanation tells how the cartons will fit into the master pack (shipping box).

Score Point: 3

The response shows the student has a sufficient understanding of the needed mathematical skills to solve the problem.The student has chosen either 4 in. X 2 in. X 2 in. or 2 in. X 8 in. X 1 in. which is equal to 62. The number of cartons (62) that the master pack (shipping box) will hold has been indicated. At least 3 of the sketches show how the size of carton fits into the box and have been labeled with sizes. The explanation of support for the choice communicates the support but it may lack focus. The explanation may not describe how the cartons will fit into the master pack (shipping box). A more simplistic explanation such as "it holds the most or the cartons fit into the box" is given.

Score Point: 2

The response shows the student has a partial or incomplete understanding of the needed mathematical skills needed to solve the problem.The student has chosen the wrong size carton. There has been a partial attempt to show how the size of carton will fit into the box and/or the sketches have been incorrectly labeled. The explanation of support for the choice may indicate confusion or lack focus.

Score Point: 1

The response shows the student has little or no understanding of the needed mathematical skills to solve the problem.

Score Point: 0

Off Task or No Attempt